

WHAT IS CLAIMED IS:

1. A method of running a spiral wound membrane element, comprising an envelope separation membrane wound on the outer
5 peripheral surface of a perforated hollow pipe and allowing back wash reverse filtration with a back pressure higher than 0.05 MPa and not more than 0.3 MPa,

comprising a step of performing an operation of injecting gas of not more than 0.3 MPa from at least one opening end of
10 said perforated hollow pipe as recovery of a filtration velocity.

2. The method of running a spiral wound membrane element according to claim 1, wherein

15 said step of performing an operation includes a step of performing an operation of introducing a washing liquid from at least one opening end of said perforated hollow pipe and discharging said washing liquid from at least one end of said spiral wound membrane element thereby performing back wash
20 reverse filtration of said separation membrane with a back pressure higher than 0.05 MPa and not more than 0.3 MPa in combination with said operation of injecting gas as recovery of a filtration velocity.

25 3. The method of running a spiral wound membrane element

according to claim 1, wherein

said step of performing an operation includes a step of performing an operation of axially feeding a raw liquid through said spiral wound membrane element in combination with said
5 operation of injecting gas as recovery of a filtration velocity.

4. The method of running a spiral wound membrane element according to claim 3, wherein

10 said step of performing an operation further includes a step of returning at least part of said raw liquid axially fed through said spiral wound membrane element to a feeding side of said spiral wound membrane element again.

15 5. The method of running a spiral wound membrane element according to claim 1, wherein

said separation membrane is formed by bonding a permeable membrane body to a surface of a porous sheet material, and said permeable membrane body is bonded to said surface of said porous
20 sheet material in an anchored state.

6. A method of running a spiral wound membrane module, comprising a pressure vessel having a raw liquid inlet and one or a plurality of spiral wound membrane elements stored in said
25 pressure vessel with said spiral wound membrane element

including a perforated hollow pipe and an envelope separation membrane wound on the outer peripheral surface of said perforated hollow pipe and allowing back wash reverse filtration with a back pressure higher than 0.05 MPa and not
5 more than 0.3 MPa,

comprising a step of performing an operation of injecting gas of not more than 0.3 MPa from at least one opening end of said perforated hollow pipe as recovery of a filtration velocity.

10 7. The method of running a spiral wound membrane module according to claim 6, wherein

said step of performing an operation includes a step of performing an operation of introducing a washing liquid from
15 at least one opening end of said perforated hollow pipe and discharging said washing liquid from at least one end of said spiral wound membrane element for taking out said washing liquid from said pressure vessel thereby performing back wash reverse filtration of said separation membrane with a back
20 pressure higher than 0.05 MPa and not more than 0.3 MPa in combination with said operation of injecting gas as recovery of a filtration velocity.

25 8. The method of running a spiral wound membrane module according to claim 6, wherein

said step of performing an operation includes a step of performing an operation of feeding a raw liquid into said spiral wound membrane element from said raw liquid inlet of said pressure vessel and axially feeding said raw liquid through said spiral wound membrane element while taking out said axially fed raw liquid from said pressure vessel in combination with said operation of injecting gas as recovery of a filtration velocity.

9. The method of running a spiral wound membrane module according to claim 8, wherein

said step of performing an operation includes a step of re-feeding at least part of said raw liquid taken out from said pressure vessel to said raw liquid inlet.

10. The method of running a spiral wound membrane module according to claim 7, wherein

said step of performing an operation further includes a step of re-feeding at least part of said washing liquid taken out from said pressure vessel to said raw liquid inlet.

11. The method of running a spiral wound membrane module according to claim 6, wherein

said separation membrane is formed by bonding a permeable membrane body to a surface of a porous sheet material, and said

permeable membrane body is bonded to said surface of said porous sheet material in an anchored state.

12. A treatment system comprising:

5 a spiral wound membrane module comprising a pressure vessel having a raw liquid inlet and one or a plurality of spiral wound membrane elements stored in said pressure vessel, each spiral wound membrane element including a perforated hollow pipe and an envelope separation membrane wound on the outer
10 peripheral surface of said perforated hollow pipe and said separation membrane having back pressure strength allowing back wash reverse filtration with a back pressure higher than 0.05 MPa and not more than 0.3 MPa;

15 a first raw liquid feeding system for feeding a raw liquid into said spiral wound membrane element through said raw liquid inlet of said pressure vessel;

a permeated liquid takeout system for taking out a permeated liquid from at least one opening end of said perforated hollow pipe; and

20 a gas injection system for injecting gas of not more than 0.3 MPa into said spiral wound membrane element from at least one opening end of said perforated hollow pipe.

13. The treatment system according to claim 12, further
25 comprising:

a washing liquid introduction system for introducing a washing liquid from at least one opening end of said perforated hollow pipe.

5 14. The treatment system according to claim 12, further comprising:

 a second raw liquid feeding system for feeding a raw liquid into said spiral wound membrane element through said raw liquid inlet of said pressure vessel for axially feeding
10 said raw liquid through said spiral wound membrane element and taking out said axially fed raw liquid from said pressure vessel.

 15. A method of running a spiral wound membrane element,
15 comprising an envelope separation membrane wound on the outer peripheral surface of a perforated hollow pipe and allowing back wash reverse filtration with a back pressure higher than 0.05 MPa and not more than 0.3 MPa,

 comprising a step of continuously or intermittently
20 diffusing bubbles into a liquid coming into contact with the surface of said separation membrane.

 16. The method of running a spiral wound membrane element according to claim 15, wherein

25 said separation membrane is formed by bonding a permeable

membrane body to a surface of a porous sheet material, and said permeable membrane body is bonded to said surface of said porous sheet material in an anchored state.

17. A method of running a spiral wound membrane element, comprising an envelope separation membrane wound on the outer peripheral surface of a perforated hollow pipe and allowing back wash reverse filtration with a back pressure higher than 0.05 MPa and not more than 0.3 MPa,

comprising a step of continuously or intermittently supplying ultrasonic vibration to a liquid being in contact with the surface of said separation membrane.

18. A method of running a spiral wound membrane module, comprising a pressure vessel and one or a plurality of spiral wound membrane elements stored in said pressure vessel, each spiral wound membrane element including an envelope separation membrane wound on the outer peripheral surface of a perforated hollow pipe and allowing back wash reverse filtration with a back pressure higher than 0.05 MPa and not more than 0.3 MPa,

comprising a step of diffusing bubbles into a liquid stored in said pressure vessel.

19. The method of running a spiral wound membrane module according to claim 18, wherein

said step of diffusing bubbles into a liquid includes a step of feeding a raw liquid from an end of said spiral wound membrane element while diffusing bubbles into said raw liquid and taking out a permeated liquid from at least one opening
5 end of said perforated hollow pipe.

20. The method of running a spiral wound membrane module according to claim 18, wherein

10 said step of diffusing bubbles into a liquid includes a step of introducing a washing liquid from at least one opening end of said perforated hollow pipe and discharging said washing liquid from at least one end of said spiral wound membrane element thereby diffusing bubbles into said washing liquid while performing back wash reverse filtration on said
15 separation membrane with a back pressure higher than 0.05 MPa and not more than 0.3 MPa in washing.

21. The method of running a spiral wound membrane module according to claim 18, wherein

20 said step of diffusing bubbles into a liquid includes a step of axially feeding a raw liquid or a washing liquid through said spiral wound membrane element and diffusing bubbles into said raw liquid or said washing liquid in flushing.

25 22. The method of running a spiral wound membrane module

according to claim 18, wherein

said step of diffusing bubbles into a liquid includes a step of diffusing bubbles into a raw liquid or a washing liquid present in said pressure vessel when stopping running.

5

23. The method of running a spiral wound membrane module according to claim 18, further comprising a step of continuously or intermittently feeding a partial raw liquid axially through said spiral wound membrane element and taking out said partial raw liquid from said pressure vessel.

10

24. The method of running a spiral wound membrane module according to claim 23, further comprising a step of returning at least part of said raw liquid taken out from said pressure vessel to a feeding side again.

15

25. A spiral wound membrane module comprising:
a pressure vessel having a raw liquid inlet and a raw liquid outlet;

20

one or a plurality of spiral wound membrane elements stored in said pressure vessel;

an air diffuser diffusing bubbles into a liquid stored in said pressure vessel; and

a circulation system returning a raw liquid taken out from said pressure vessel through said raw liquid outlet to

25

T050200649660

said raw liquid inlet, wherein

each spiral wound membrane element includes a perforated hollow pipe and an envelope separation membrane wound on the outer peripheral surface of said perforated hollow pipe and allows back wash reverse filtration with a back pressure higher 5 than 0.05 MPa and not more than 0.3 MPa.